Selenium and coronary heart disease: a meta-analysis

CRD summary
The authors concluded that selenium supplements cannot currently be recommended for the prevention of cardiovascular disease. Although the authors' conclusion appears to follow from the results presented, their limited search makes it difficult to confidently assess the reliability of the review.

Authors' objectives
To examine the relationship between selenium biomarkers and coronary heart disease (CHD), and to evaluate the efficacy of selenium supplements for the prevention of CHD.

This abstract only refers to the evaluation of efficacy.

Searching
MEDLINE was searched from inception to March 2006 using the reported search terms. No language restrictions were applied. In addition, the Cochrane CENTRAL Register was searched and references in reports and reviews were screened.

Study selection
Randomised controlled trials (RCTs) that evaluated the effect of selenium supplements, either alone or in combination with other vitamins or minerals, for the prevention of cardiovascular disease (CVD) were eligible for inclusion. Studies had to report sufficient information about selenium exposure. The primary review outcome was CHD, defined as any combination of fatal or nonfatal CHD and myocardial infarction (MI). Studies reporting total cardiovascular outcomes were also included. The review excluded studies assessing angiographically-defined outcomes or angina pectoris and other cardiovascular outcomes such as heart failure, stroke, peripheral arterial disease and nonatherosclerotic heart disease.

All of the included studies were placebo-controlled and most evaluated selenium combined with other vitamins or minerals. The doses of selenium ranged from 75 to 200 μg/day. The duration of interventions ranged from 0.5 to 7.6 years. Studies were in patients with existing CHD (including those with acute MI), healthy adults, residents in a geographical area, and patients with skin cancer who did not have CVD. The mean age of the participants ranged from 47 to 62 years and 39 to 87% were male. The included studies assessed mortality from acute MI and CVD and the incidence of CHD and CVD.

Two reviewers independently selected the studies and resolved any disagreements by consensus.

Assessment of study quality
Validity was assessed using the Jadad scale, which considers the reporting and handling of randomisation, blinding and handling of withdrawals. The maximum possible score was 5 points.

The authors did not state how the validity assessment was performed.

Data extraction
Authors were contacted if required. Relative risks (RRs) with 95% confidence intervals (CIs) were calculated for each study on an intention-to-treat basis.

Two reviewers independently extracted the data and resolved any disagreements by consensus.
Methods of synthesis
Pooled RRs with 95% CIs were calculated using an inverse-variance weighted random-effects model. Publication bias was assessed using a funnel plot; however, results were not reported for the analysis of selenium efficacy. The influence of each study was assessed by repeating the analysis after omitting each study in turn.

Results of the review
Six RCTs (n=17,766) were included.

Four studies scored 5 out of 5 on the Jadad scale; the other studies scored 1 or 2. Five studies were double-blinded.

There was no statistically significant difference in CHD between selenium and placebo (RR 0.89, 95% CI: 0.68, 1.17). The results were found to be similar after omitting each study in turn.

Authors' conclusions
There was insufficient evidence to evaluate the efficacy of selenium supplements for the prevention of CVD. Selenium supplements cannot currently be recommended for the prevention of CVD.

CRD commentary
The review question was stated clearly. Limiting the search to two databases might have resulted in the omission of other relevant studies. No language restrictions were applied but there were no attempts to minimise publication bias. Appropriate methods were used to minimise reviewer error and bias during the study selection and data extraction processes. Only RCTs were included, and validity was assessed and some aspects of it reported. The studies were combined using meta-analysis and the influence of individual studies was examined. Although a forest plot showed that none of the studies found any significant difference between the treatments, there was no formal assessment of statistical heterogeneity. The authors' conclusion appears to follow from the results presented, but their limited search makes it difficult to confidently assess the reliability of the review.

Implications of the review for practice and research
Practice: The authors stated that selenium supplements cannot currently be recommended for the prevention of CVD.

Research: The authors stated that evidence from large ongoing trials is required to establish low selenium concentration as a risk factor for CVD.

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This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.